White light interferometry specialist chooses Nikon lenses

Nikon CF IC EPI Plan interference lenses, types DI and TI, are used in the smartWLI sensors supplied by GBS to use them as white light interferometers

MICROSCOPY

The product family named: smartWLI are manufactured by Gesellschaft für Bild- und Signalverarbeitung (GBS) mbH in Ilmenau, Germany (www.gbs-ilmenau.de), They consist of measuring devices, sensors and kits that transform a classic incident light microscope into an advanced 3D Surface measuring device (using exceptional white light interferometry optics).

For the special objectives used in the smartWLIs, GBS has entered into a strategic alliance with Nikon Metrology (www.nikonmetrology.com), to supply CF IC EPI Plan DI interference lens sets with 10x, 20x 50x or 100x magnification, as well as Plan TI lenses with the lower 2.5x and 5x magnifications.

Matthias Liedmann, Sales Manager at GBS, explains: "White light interferometry is one of the proven optical measurement methods for capturing 3D topographies and allows atomic height resolutions and lateral resolutions up to the limit of optical resolution.

For example, a Nikon 50x interference lens in our smartWLI-compact 3D sensor enables the detection of surface structures and roughness measurements with a point density of 0.2 µm. The resolution is thus significantly higher than it could be achieved using a tactile measuring device with a tip radius of 2 µm."

GBS and Nikon Metrology both benefit from this partnership. With the introduction of the smartWLI compact and its use for roughness measurements, many more 50x lenses were sold in 2020 than in the previous years. The current order book shows that

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Torsten Machleidt, Managing Director of GBS

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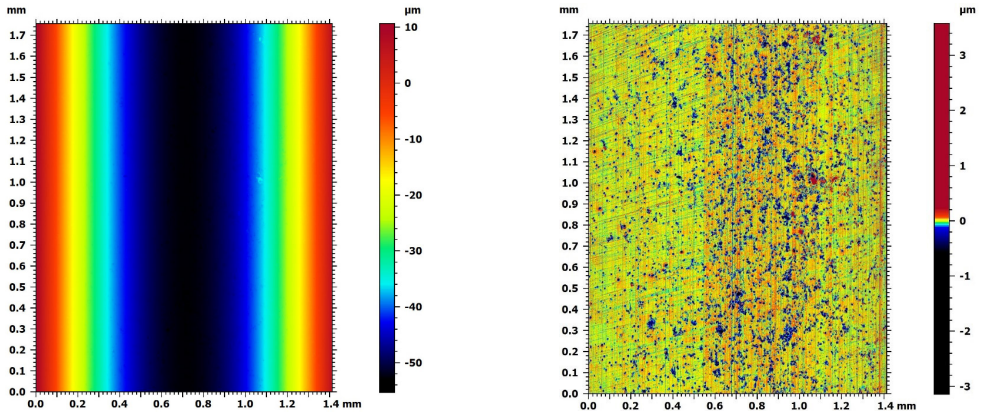


Measurement of the surface of a metal guide rail by a GBS smartWLI fitted with a Nikon CF IC EPI Plan DI 50x interference lens. The image on the right shows the microstructure after shape filtering.

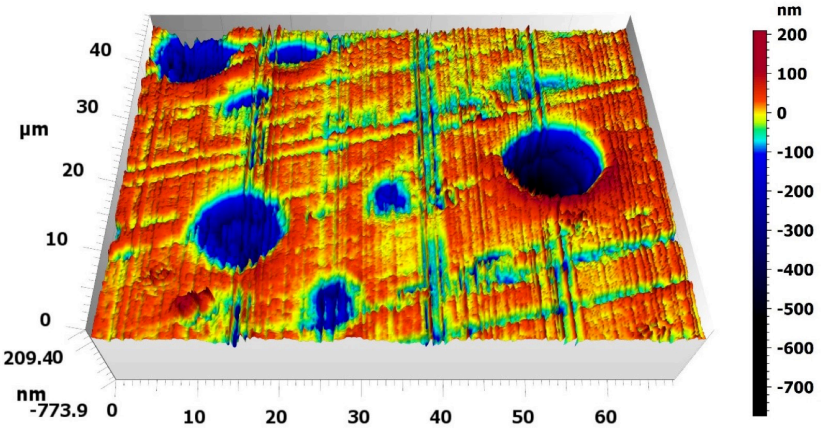
this rate of growth is continuing. In addition for the latest product the smartWLI next will be equipped with a multi objective nosepiece, so that the number of lenses used per sensor will also increase. Torsten Machleidt, Managing Director of GBS comments, "We rely completely on interference objectives from our supplier and partner Nikon Metrology. Without them, this success would not have been possible."

The optical 3D measuring devices allow not just a single line but entire surface areas to be recorded and evaluated rapidly. Instead of the time consumed waiting for approximately 10,000 measuring points to be acquired by a tactile profile inspection, multiples of 100,000 up to one million measuring points can be recorded almost every second and evaluated in three dimensions, depending on the matrix camera used.

The sensors and measuring devices are typically used in research facilities, measuring rooms and production lines, where surface structures and micro-geometries have to be measured and characterised in the shortest time. There are applications in geometric measurements and the detection of defects possible in ultra-precise optical components.

High speed analysis and enhancement of the 3D image data is achieved by massive parallel image processing achieved using bespoke algorithms running in general purpose graphic processing units, (GPGPUs) with up to 3,000 cores and 10 teraflops of processing power available!

This impressive number-crunching capability allows the acquisition of surface related data in fractions of a second and enables the processing of the measurements into 3D data effectively in real time. This opens up the possibility of using the smartWLI sensors for mobile locations or in production lines in order to check 100% of all components there and to use the information as feedback for dynamic process control.



The market partial area of the shape filtered running surface magnified.

Sales.Europe.NM@nikon.com
www.nikonmetrology.com
+32 16 74 01 00